SIGNAL PROCESSING METHOD... Jan. 22, 2004 Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1990.69202 Sheet 1 of 29 (312) 360 0080

FIG. 1 PRIOR ART

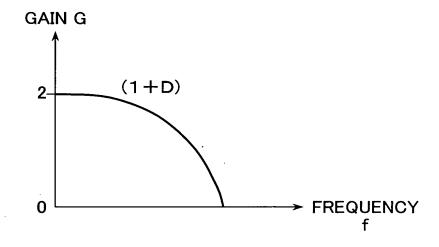
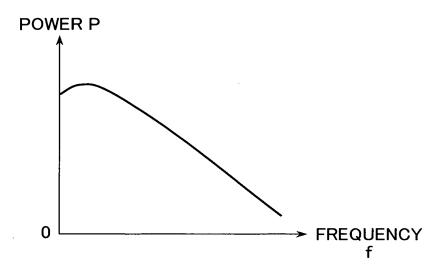


FIG. 2 PRIOR ART



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## FIG. 3 PRIOR ART

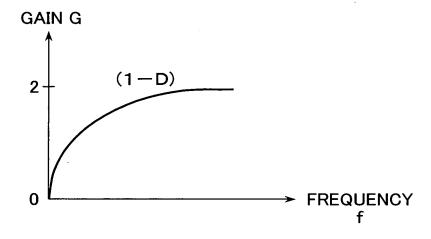
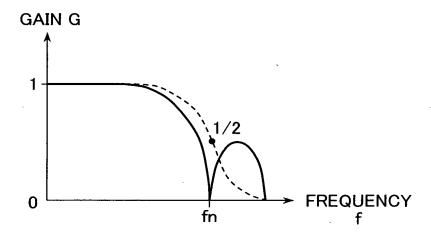


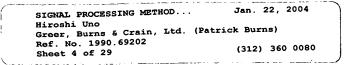
FIG. 4 PRIOR ART



Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns)
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Sheet 3 of 29 (312) 36 (312) 360 0080 3/29 **►** HOST HARD DISK CONTROLLER PROGRAM MEMORY DATA BUFFER MEMORY MCU <del>0</del>^ <del>م</del>ر 2° 25 25 24 DRIVE LOGIC DSP **2**6 28 FIG. 5 READ CHANNEL (RDC) SERVO DRIVER 30 36 - 236 - 536 - 336 - 4-36-6 -36-VCM V 40 HEAD IC SPM 42 38 - 2က 38 - 138-

SIGNAL PROCESSING METHOD . . .

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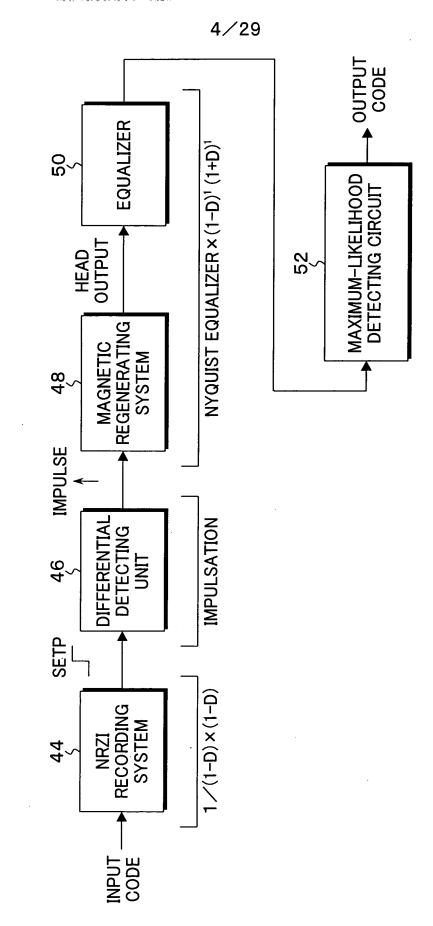


FIG. 6

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FIG. 7

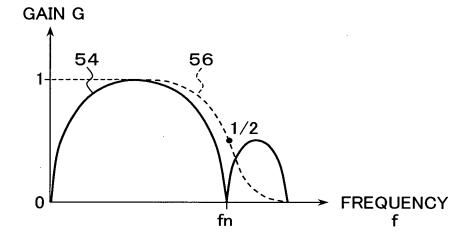
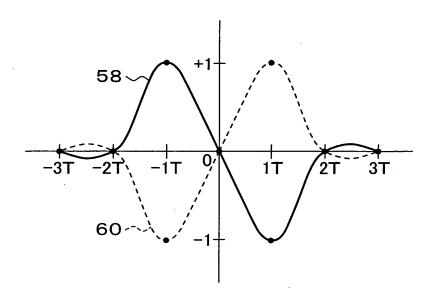


FIG. 8



SIGNAL PROCESSING METHOD... Hiroshi Uno Jan. 22, 2004 Greer, Burns & Crain, Ltd. (Patrick Burns)
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Sheet 6 of 29 (312) 36 (312) 360 0080 6/29 **→** DATA MAXIMUM-LIKELIHOOD DETECTING CIRCUIT DECODER 86 8,4 → EQUALIZER ENCODER 82 62 SAMPLE WRITE COMPENSATION CIRCUIT VFO 80 8 64 LOW-PASS FILTER NRZI H CONVERTER CIRCUIT 99 AGC CIRCUIT 9/

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FIG. 10

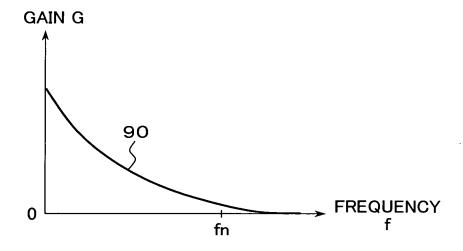
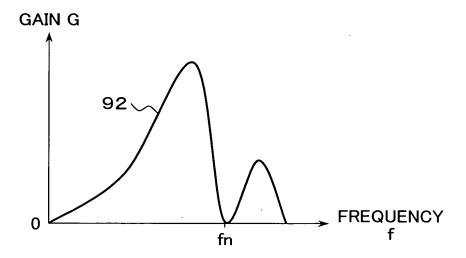


FIG. 11



SIGNAL PROCESSING METHOD... Jan. 22, Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1990.69202 Sheet 8 of 29 (312) 36 Jan. 22, 2004 (312) 360 0080 8/29 Ę. ×  $\overset{
ightarrow}{\sigma}$ × σ £ × ₫ £

(1 + D)

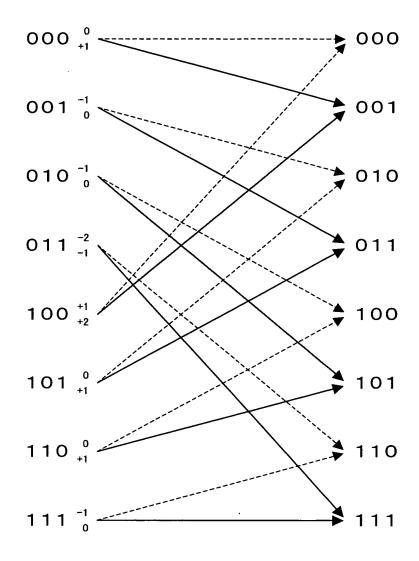
 $(1-D) \cdot (1+D)$ 

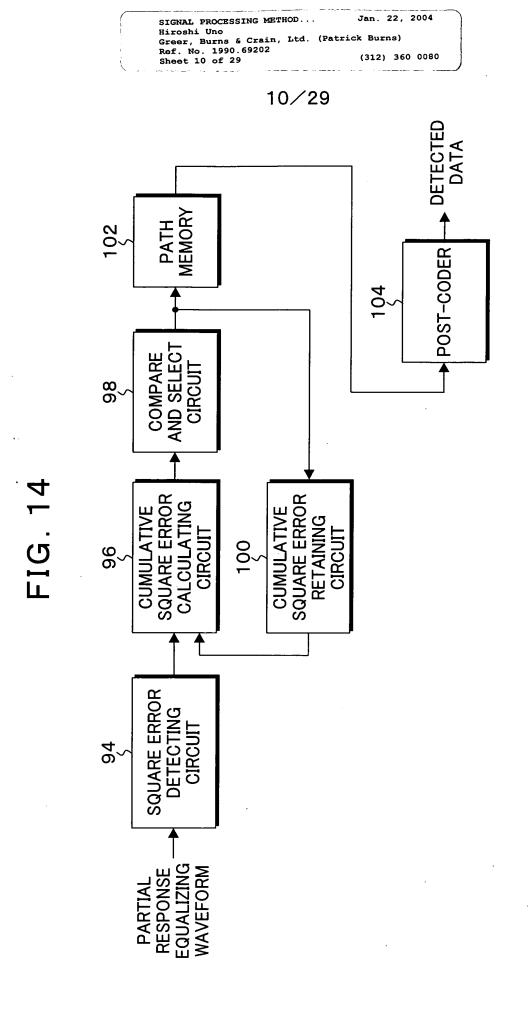
FIG. 12

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FIG. 13





Jan. 22, 2004 SIGNAL PROCESSING METHOD... Hiroshi Uno Greer, Burns & Crain, Ltd. Ref. No. 1990.69202 Sheet 11 of 29 (312) 360 0080 11/29 0 0 -1 0 01011011100111001110110110011100111000111000 0 0 0 0 1 0-11 0-11-10 0 1-11 0-11 0 0-10 1-11 0 0-11-10 0 0 1-11 00011110 0001111 0 1 0 1 1 0 0 1 0 1 0 1 1 0 0 1 0 0 1 1 0 1 1 0 0 0 1 1 0 1 1 0 01010111 00 RECORDING CURRENT 1/(1-P) (1 - D)DIFFERENTIAL DETECTION **OUTPUT CODE** HEAD OUTPUT INPUT CODE MAXIMUM-LIKELIHOOD DETECTION EQUALIZER DATA DATA 15A 15H 5万 15I

Jan. 22, 2004 SIGNAL PROCESSING METHOD... Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns)
Ref. No. 1990.69202
Sheet 12 of 29 (312) 30 (312) 360 0080 12/29 OUTPUT CODE EQUALIZER NYQUIST EQUALIZER × (2-D)1 (1+D)1 106 MAXIMUM-LIKELIHOOD DETECTING CIRCUIT HEAD OUTPUT 108 MAGNETIC REGENERATING SYSTEM 48 IMPULSE DIFFERENTIAL DETECTING UNIT **IMPULSATION** 46 SETP  $1/(1-D) \times (1-D)$ NRZI RECORDING SYSTEM 44 INPUT

FIG. 16

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FIG. 17

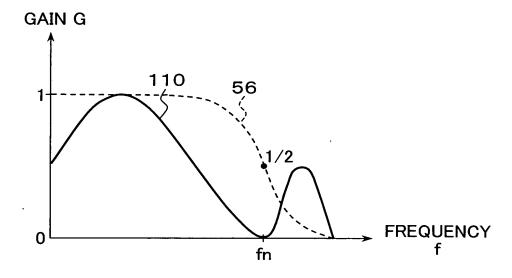
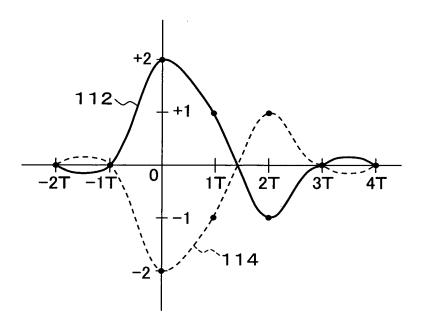
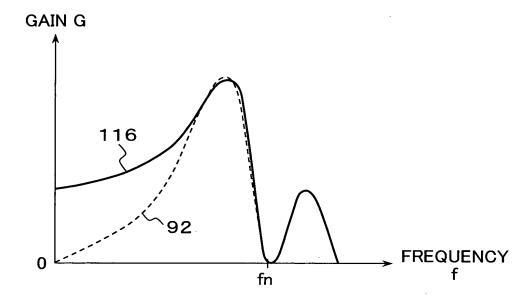


FIG. 18



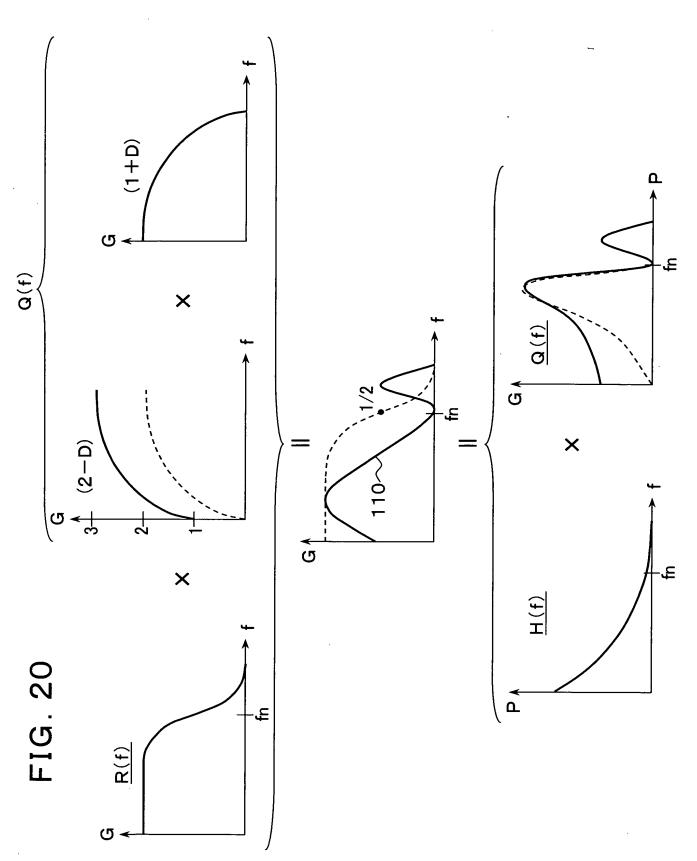
SIGNAL PROCESSING METHOD... Jan. 22, 2004
Hiroshi Uno
Greer, Burns & Crain, Ltd. (Patrick Burns)
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FIG. 19



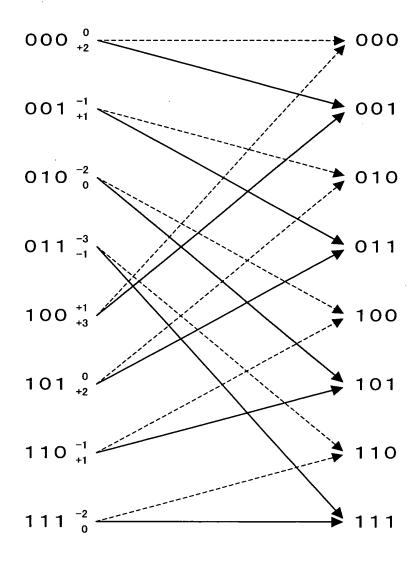
SIGNAL PROCESSING METHOD... Jan. 22, 2004
Hiroshi Uno
Greer, Burns & Crain, Ltd. (Patrick Burns)
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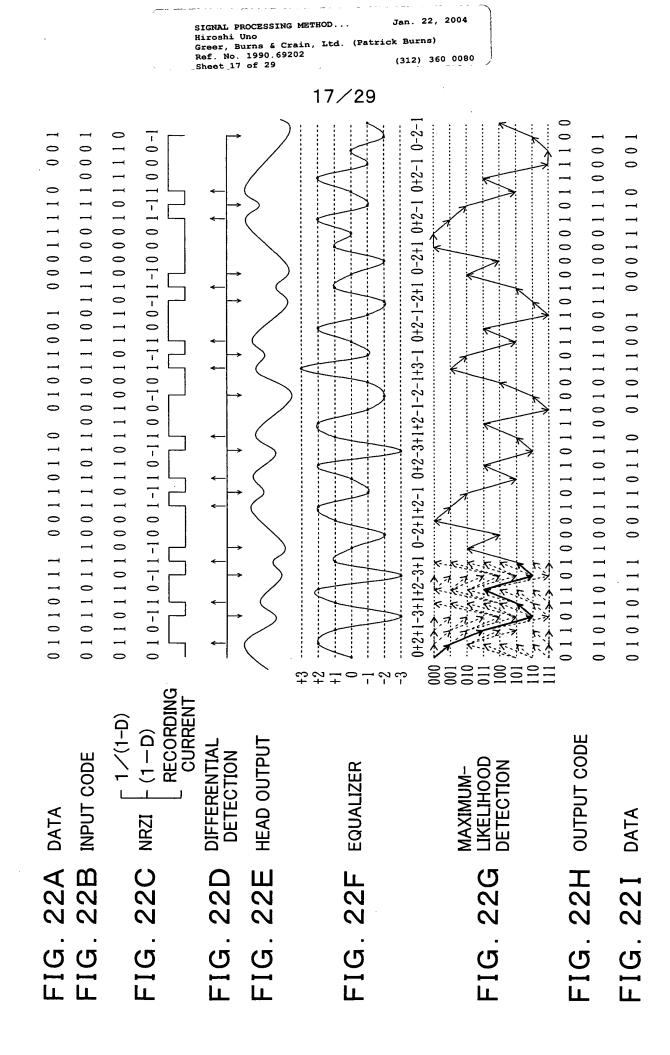
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FIG. 21





Jan. 22, 2004 SIGNAL PROCESSING METHOD . . . SIGNAL PROCESSING METHOD... Jan. 22, Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1990.69202 Sheet 18 of 29 (312) 30 (312) 360 0080 18/29 OUTPUT CODE EQUALIZER NYQUIST EQUALIZER × (3-2D) (1+D) 1,18 MAXIMUM-LIKELIHOOD DETECTING CIRCUIT HEAD OUTPUT 120 MAGNETIC REGENERATING SYSTEM 48 IMPULSE DIFFERENTIAL DETECTING UNIT **IMPULSATION** 46 SETP  $1/(1-D) \times (1-D)$ NRZI RECORDING SYSTEM 44

> INPUT CODE

FIG. 23

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FIG. 24

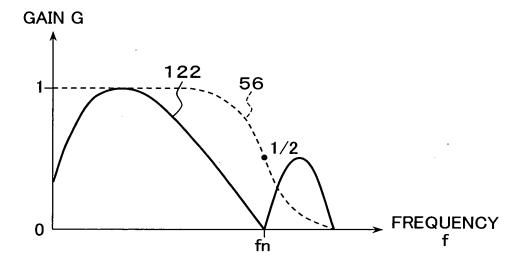
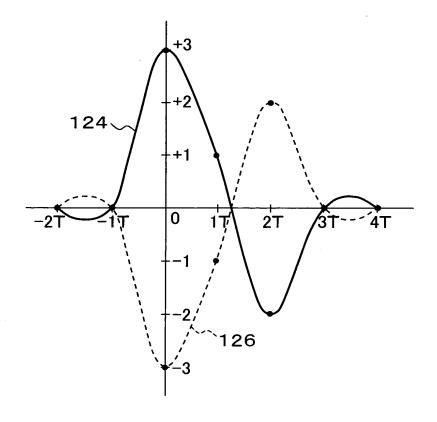
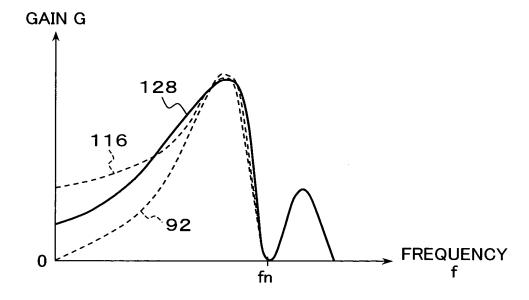


FIG. 25

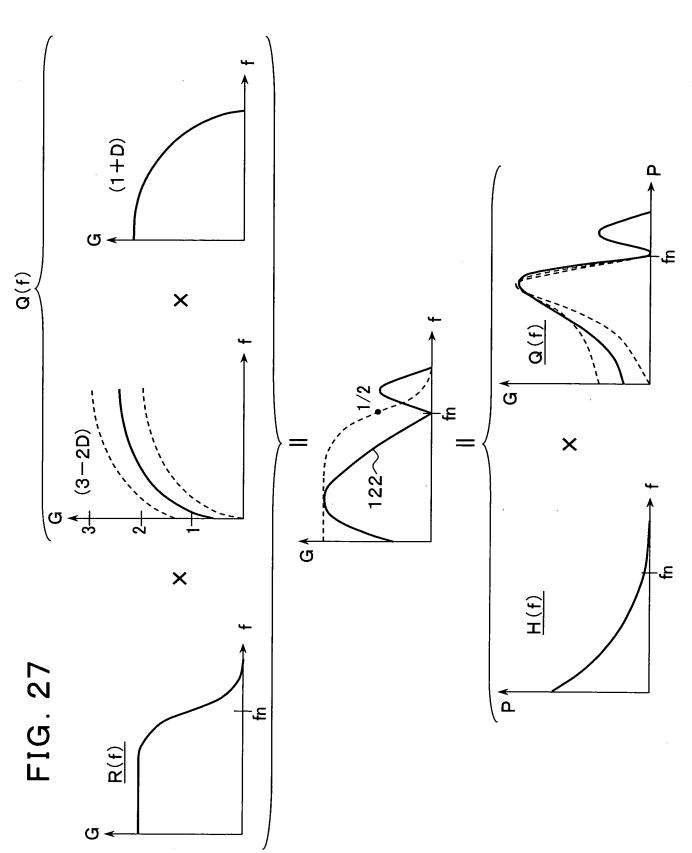


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FIG. 26

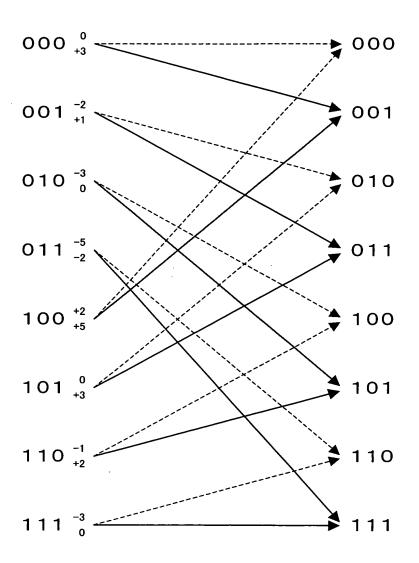


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FIG. 28



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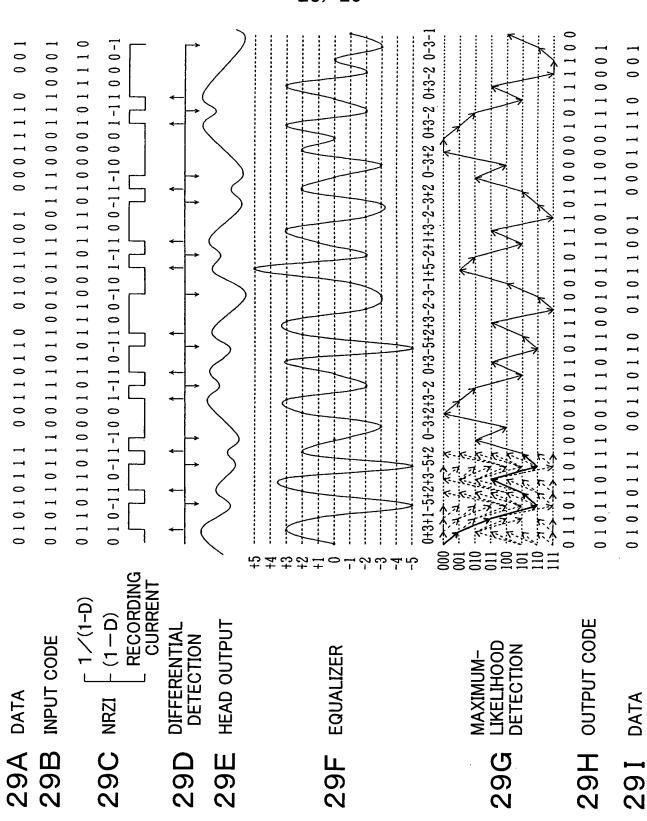
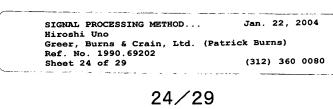


FIG.

FIG.

FIG.



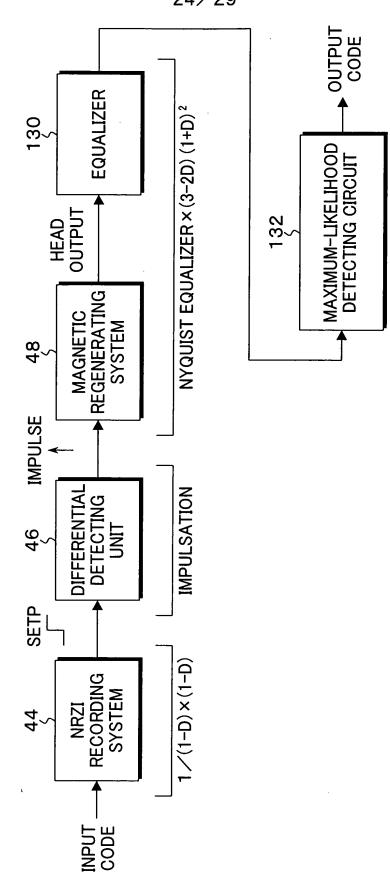


FIG. 30

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FIG. 31

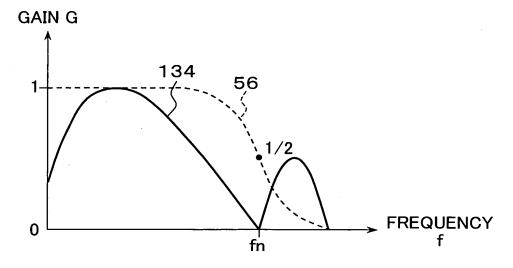
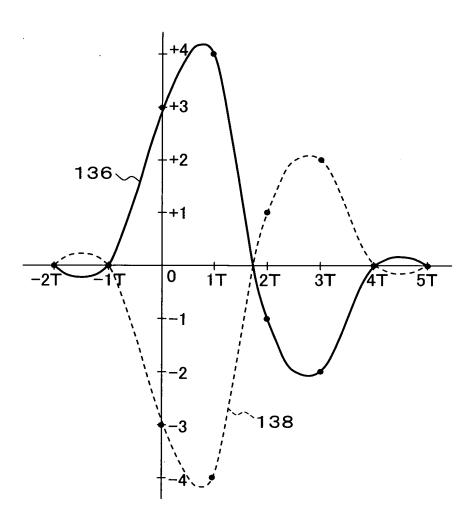


FIG. 32

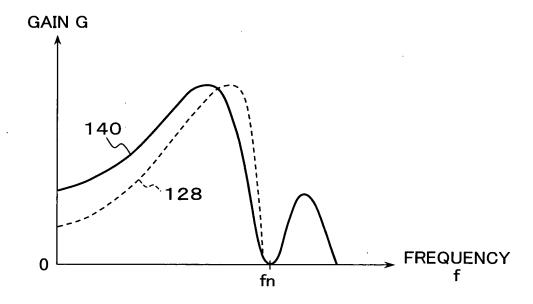


SIGNAL PROCESSING METHOD... Jan. 22, 2004
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Greer, Burns & Crain, Ltd. (Patrick Burns)
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S 9 5 2

FIG. 33

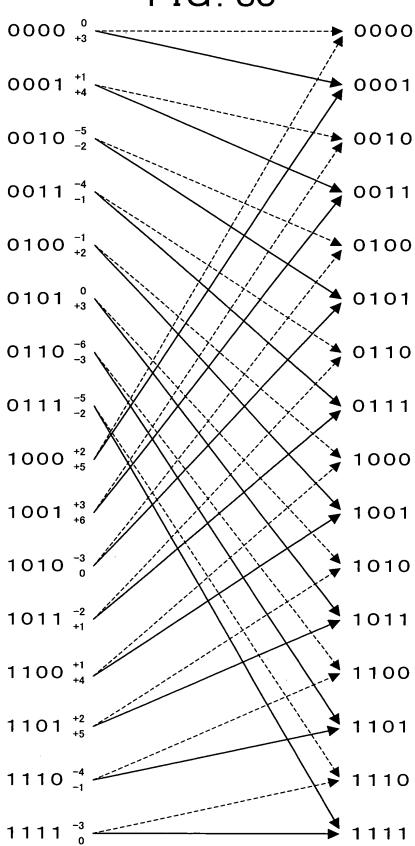


SIGNAL PROCESSING METHOD... Jan. 22, Hiroshi Uno Greer, Burns & Crain, Ltd. (Patrick Burns) Ref. No. 1990.69202 Sheet\_27\_of\_29 (312) 36 (312) 360 0080 27/29 (1+D) × (1+D) **₹** Ę. × × ᢆ ع. × <u>a</u> FIG. 34 Ę. RE **७** ≺

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FIG. 35



SIGNAL PROCESSING METHOD

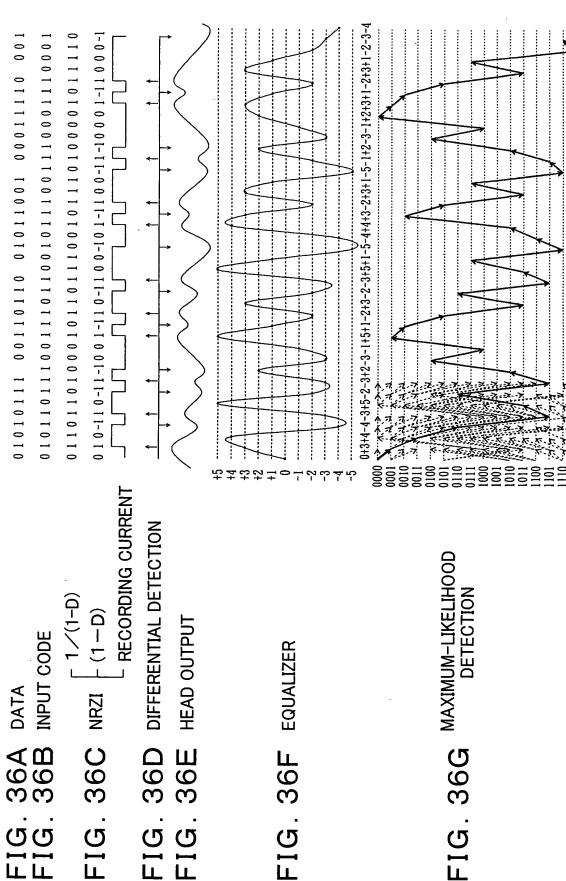
22,

Hiroshi Uno Greer, Burns & Crain, Ref. No. 1990.69202

(Patrick Burns)

(312) 360 0080

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36F

36E

36D

FIG.

OUTPUT CODE DATA FIG. 36H 36 I FIG.

01011011100111001110010111100111000111000

00110110 01011001 00011110

0 0